Business Model Patterns and Sustainability

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Contents

1 Basics on Institutionalisation Processes

1.1 Dynamics of the Levels of Our Technology Definition

Technology was defined in the lecture as interrelation of

- globally available *procedural knowledge*,
- *institutionalised procedures* ("state of the art") and
- private *procedural skills*.

The dynamics of these levels are closely linked:

1. Private procedural skills are based on institutionalised practices from which *justified expectations* are derived.
2. The use of private procedural skills leads to *experienced results*. Comparing them with justified expectations influences the institutionalisation of practically successful actions as proven practices.
3. This empiricism is *condensed and generalised* as procedural knowledge extending it with appropriate conceptual systems, which in turn has an influence on the further development of "reasonable" practices and their forms of institutionalisation as *contexts of justification*.

1.2 Transformation of Practically Proven into Proven Practices

The transformation of what is practically proven into proven practices follows a general line:

1. Procedures are standardised as processes and thus become comparable.
2. Tools are developed to support the operation of these processes.
3. Problems in the operation of these procedures are analysed, solutions are generalised, the practically proven is condensed into *patterns* and further into standards, norms and the *state of the art*.

The generalisation of isolated practices into patterns also plays a role in the TRIZ process model (Fig. 1): Darrell Mann's *Select* phase draws on these generalised experiences, which, however, for the TRIZ *user* only play a role as proven practices. Scientific elaboration means both empirically to consolidate these proven practices and to integrate them into broader contexts of justification and to develop corresponding conceptual worlds.

1.3 Patterns and Contexts

These forms of institutionalisation are embedded as initially domain-specific patterns in a *domain-specific* methodology, for example as industry sector-specific standards and thus are *contextualised*. These patterns can be further generalised to cross-domain standards such as the APQC PCF as a Cross-Industry Process Classification Framework [2]. However, this is also *not universally valid*, but contextualised itself, as it still refers to organisations of a specific-general design.

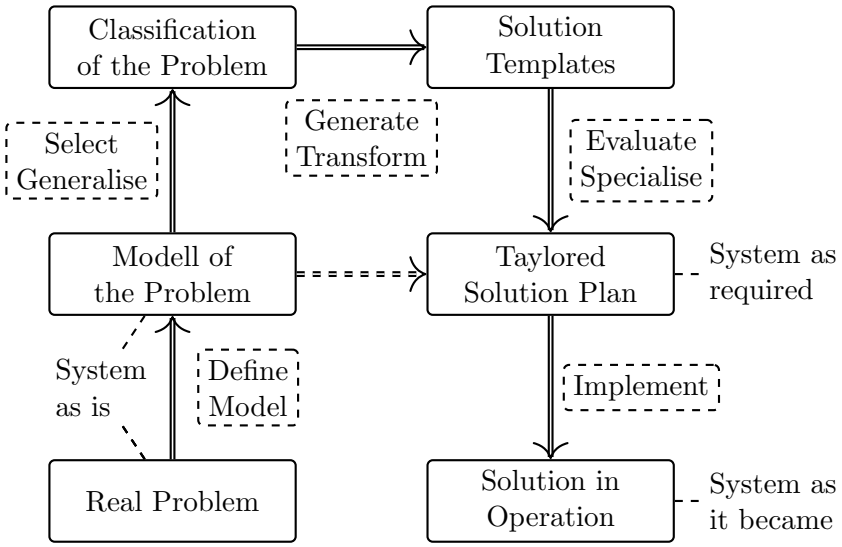

Fig. 1: The TRIZ Process Model

1.4 TRIZ and Patterns

TRIZ is similarly structured. It comes with a toolbox of problem-solving patterns (Select)

- 40 principles
- 76 standards for SF models
- Evolutionary patterns of technical systems
- Evolutionary lines of technical systems

but assumes a specific type of modelling (Define) with

- systemic delimitation
- ideality
- focussing of an operative zone
- action and evaluation parameters in functional modelling
- Problems as contradictory behaviour of evaluation parameters when action parameters are changed.

Only on the basis of this (Define) is (Select) possible. It is also not only a matter of *selecting* the patterns suitable for the solution, but also of *selecting proven methodological procedures* that are based on the respective patterns.

2 Development of Business Process Modelling

When we talk about Business TRIZ today, we are talking about a similar development of institutionalisation of structuring procedures in the area of business processes. In the context of P-TRIZ (Seminar on 9 May 2022), we had identified three stages of that development:

1. With the transition to more advanced forms of industrial production at the beginning of the 20th century, individual work processes were deconstructed, charged with forms of description and assembled into new "living" systems – the *assembly line system* of modern industrial production. The control of the complex interrelationships in such an organisation remains as an "art of management" beyond the realm covered by these structural standardisation.
   At the centre of institutionalisation are complex engineering disciplines such as process engineering or automation technology, which are concerned not only with the processes themselves, but also the tools (understood in a comprehensive sense) that have been and are being created in the context of this institutionalisation.
   With its procedures and patterns, classical TRIZ aims at problem solving in this area. It can be applied only insofar as the concrete application domain is conceptually penetrated to such an extent that the specific type of modelling required in the TRIZ analysis phase can be carried out. In this sense TRIZ is a "scientific method".
   "Management" remains an art, as in "Mintzberg on Management" [11], for example, whereby an artist must certainly master the *technical procedures* of his subject, but the practical combination of such techniques remains at the level of private procedural skills.
2. Since the 1960s, the structuring of procedures in the operational management of individual companies has gained in importance as *business process modelling*.
   These institutionalisation processes are not possible without the preceding institutionalisations of the technical core processes and build on them.
   Howard Smith [15] stated in 2006 that these institutionalisation processes are well advanced with the development and widespread use of computer-based business process management systems and the establishment of uniform conceptual systems such as the APQC PCF [2]. This would allow us to move on to the next level, to *P-TRIZ*.

   > P-TRIZ is the application of modern TRIZ towards business process improvement, innovation, and transformation. Coupled to BPM methods, it provides the engineering discipline that amplifies the creativity of those who seek to re-design processes. [15]

3. In the management literature, this level of institutionalisation of structuring in intercompany cooperation has since been roughly associated with the term *business model*. It is based on the forms of institutionalisation of intra-company operative business, but did not develop as quickly as Howard Smith expected at the time.

3 Business Process Models and Business Models

3.1 Business Process Models

This confusion is also reflected in the literature consulted for the seminar. In [4], "business process model patterns" are examined, defined as

> the description of a proven solution to a recurring problem that is related to the creation or modification of business process models in a specific context. This description is typically organised in a structured document supporting the reader in understanding under which circumstances the proposed solution will be useful (ibid, p. 974),

The authors clearly emphasise that

> in economics the term *business model patterns* is used for a pattern describing the economic principles of an organisation [...] Although business model patterns can be depicted visually, they were not considered in our survey due to their specificity on the economics perspective.

The aim of the work is described as to "discuss patterns related to various aspects of process modeling" (ibib, p. 981). 15 years after [15], it is still about the third phase of the institutionalisation of patterns as a central component of a problem-solving system in the field of Business Process Landscapes of operational management.

Patterns are understood in the sense of Christopher Alexander's architecture patterns [1] or the Software design patterns of the "Gang of Four" [5]. In [8, p. 3] this is defined as follows

> A pattern is a combination of a problem and a corresponding solution that is described in a systematic and generic way, so that it can be used over and over again in different situations.

This is not exactly the same as principles, evolutionary lines or trends in TRIZ, as in these approaches there is no direct link between problem and solution, but the "TRIZ model of the system as it is" is used as starting point for selecting a systemic transformation pattern first to design the solution in general and then to concretise it with available resources (phase "Select" by Darrell Mann [10] – see the descriptions of the different *Problem Solving Tools* there). They are nevertheless also subsumed as "patterns" below.

Business TRIZ has a nevertheless similar focus as business process models in many practical applications in which it has to resolve contradictory objectives in the operational organisation of the company. However, Business TRIZ does not look for new patterns, but tries to transfer the patterns known from the technical field to this field and adapt them on the basis of experience gained. Such a transfer may seem suspicious at first glance. However, it can be observed that essential instruments of classical TRIZ, such as, e.g., the Patterns of Evolution of Technical Systems, are based on observations on market processes and developments as explained in more detail in [7] and thus have a certain relevance not only for the level of Business Process Management Systems but also for the level of Business Models.

3.2 Business Models

The level of business models has been studied more intensively since around 2010. In a first overview [16] the authors observed "that scholars do not agree on what a business model is, and that the literature is developing largely in silos, according to the phenomena of interest to the respective researchers" and present a list of eight different definitions of the notion of a business model. Nevertheless they identified emerging common themes among scholars of that area:

1. The notion of business model is emerging as a new unit of analysis.
2. Business models emphasise a system-level, holistic approach towards explaining how firms "do business".
3. Firm *activities* play an important role in the various conceptualisations of business models that have been proposed.
4. Business models seek to explain how value is created, not just how it is captured.

This strong orientation towards value creation plays a central role in [16], [12], but also in the much-cited reference [6]. Despite such a relatively homogeneous focus, however, no generally accepted "Pattern Database" has yet emerged. One problem is, of course, the focus itself, since with *value proposition* it is oriented towards a functional property of the components and not towards a functional property of the network, whose *main useful function* should be an emergent function of the network as a whole according to the theoretical approach of TRIZ.

4 Business Models and Sustainability

In this sense, the concept of sustainability is a touchstone to what extent Business Model Pattern taxonomies can address topics beyond such a narrow focus.

Today's inclusion of sustainability issues in business models is largely the result of a longer-term politicisation of this issue.

4.1 Sustainability Emerging as Business Goal

The importance of sustainable and ecological aspects in management has been a topic of public awareness at least since the reports on the *Limits to Growth* by the Club of Rome. While in the early years the debate focused on the finite nature of available natural resources and thus on longer-term development aspects of availability of a *material basis* (such as "peak oil"), in the last 20 years it has become increasingly visible that global *processes* (such as "climate change" or "extinction of species") will leave familiar paths much earlier if the established industrial mode of production which is the basis of our prosperity will be continued and further expanded.

In contrast to other globalisation processes such as, e.g., the implementation of Intellectual Property Rights, these processes do not originate and were driven by individual interest groups, but have the *cooperative action* of an inherently global "thinking" of a networked, interdisciplinary science as their basis. The problematisation was initiated and formed by

international bodies and today plays an increasingly important role in the framework of international political affairs. The formula "think globally, act locally" nevertheless expresses that those global challenges can only be met through changed local action. Corresponding awareness-raising processes at the socio-cultural and political level have meanwhile reached such a degree that at least a financially potent middle class bases its economic decisions also on ecological and social issues.

With the 17 Sustainable Development Goals (SDG) adopted in 2015 by the UN, the politicisation of this issue has reached a new dimension, as these goals anchor long-term objectives of necessary changes with today's cooperate actions.

Sustainable Development Goals

Triple Bottom Line

4.2 Sustainability and Business Models

In the business environment and more general socio-economic debates, this politicisation is anchored with the slogan of the *Triple Bottom Line: Planet – People – Profit* [3]. It obviously reveals massive contradictory dimensions in the inclusion of ecological (planet) and social (people) goals in economic processes.

Even if such a narrative is being further refined today with the PESTLE approach (addressing the political, economical, social, technological, legal and environmental dimensions), in view of the value orientation of Business Model Pattern taxonomies so far, a consistent orientation towards all three "P" can hardly be expected.

This main focus on value propositions is emphasised in [8] in the introduction to the survey citing [14]:

> A business model for sustainability "helps describing, analyzing, managing, and communicating
>
> (i) a company's sustainable value proposition to its customers, and all other stakeholders,
> (ii) how it creates and delivers this value,
> (iii) and how it captures economic value while maintaining or regenerating natural, social, and economic capital beyond its organizational boundaries".

The authors identify 45 patterns extracted from the literature on Sustainable Business Models and group them into 11 pattern groups

G1 Pricing & Revenue Patterns (4 patterns)
G2 Financing Patterns (3 patterns)
G3 Ecodesign Patterns (4 patterns)
G4 Closing-the-Loop Patterns (9 patterns)
G5 Supply Chain Patterns (6 patterns)
G6 Giving Patterns (2 patterns)
G7 Access Provision Patterns (6 patterns)
G8 Social Mission Patterns (5 patterns)
G9 Service & Performance Patterns (4 patterns)
G10 Cooperative Patterns (1 pattern)
G11 Community Platform Patterns (1 pattern)

As example the patterns in the group *Pricing & Revenue Patterns* are listed:

- Differential Pricing
- Freemium
- Innovative Product Financing
- Subscription Model

For each of the patterns context, problem, solution are describes and an example is given, e.g. for *Differential Pricing*

- *Context:* Base of the Pyramid and low-income groups in both developed and developing countries are often excluded from consumption due to price barriers.
- *Problem:* Customers might need the same product but have different payment thresholds. Hence, some customers are either unwilling or unable to pay as much as others for the same product.
- *Solution:* Charging groups with higher payment thresholds higher prices to subsidize those groups who cannot afford to pay as much.
- *Example:* [Novo Nordisk] sells insulin in developing countries at prices that are up to 20% below the mean prices charged in developed countries.

The example shows very well the structured approach (the patterns as RDF are meanwhile also part of the WUMM database), but also the extensive orientation towards new and flexible forms of value proposition, which are driven more by new possibilities emerging within digital change than by questions of sustainability. This is also emphasised in [13, p. 3]:

> General purpose idea generation tools do not usually show any specific preference to sustainable aspects, since their overall purpose is product success and the identification of unexplored market opportunities. Therefore, the attention to sustainability is random, not taken for granted and presumably dependent on designers' sensibilities towards environmental and human problems.

4.3 Lifecycle Orientation and Eco Design Principles

The approach in the works [13] and [9], which consider *Eco Design Principles* (EDP), is clearly different. Here, the focus is not on Business Models but on the Product Lifecycle and thus on *material processes* in their full complexity. Even if "market success as key for any eco-design product" [9, p. 1] is emphasised, the EDP are primarily directed at the early phases of product design.

The general orientation of EDP is described in [13, p. 3] as follows:

> During design phase, each designer is supposed to follow a list of guidelines and accordingly modify the existing product to make it more environmentally friendly. The crucial point is to exploit problem solving strategies as a framework for eco-guidelines that guide the user to make product development, taking into account first of all sustainability objectives.
>
> It is important to understand that problem-solving tools are not easy to learn, so a strong simplification is needed to guide non-experts. Unlike a structured problem-solving method that involves a preliminary phase of understanding and modeling the problem, an eco-guideline acts exclusively as an inventive trigger. Therefore, it must be both simple to understand and effective.

The aim of the EDP presented in [13] is "the customization of a set of tools that are typical of the TRIZ methodology. Almost all suggestions are based on TRIZ tools [...] However, TRIZ is not a method born to do Ecodesign and, therefore, there has been a long work of selection and adaptation of individual instruments. Only those instruments leading to solutions with less waste of resources have been chosen."

16 generic strategies

1. Switch to super system
2. Trimming
3. Dematerialization/ideality
4. Merging
5. Redesign the internal structure
6. Change the state of aggregation
7. Local quality
8. Substitute
9. Segmentation of the parts/components
10. Design for Assembly
11. Dynamics
12. The Other Way Around
13. Taking out
14. Increase control
15. Recycle/Reuse
16. Optimize

are derived, to which the identified 59 Eco Guidelines are assigned. Each of these generic strategies is embedded in the TRIZ methodology and their solving power is outlined without, however, assigning them to a problem. The authors emphasise that they "have worked on the

mechanisms of activation of creativity that are typical of the TRIZ methodology, trying to translate it into guidelines bypassing every step of problem definition." This is clearly different to the "pattern approach" as developed, e.g., in [8].

Instead, the description of each principle is limited to a detailed *Generic Suggestion*, more structured *specific suggestions* and examples.

Similar to [6], the individual EDPs are also assigned values from a morphological table with the attributes *when, action, what, how.*

- *When:* Premanufacturing, Manufacturing, Use, End of Life
- *Action:* Eliminate, Reduce Mass, Reduce Volume, Reduce Quantity, Reduce Distance, Improve Durability, Select Other.
- *What:* Raw materials, External logistics, Internal logistics, Packaging, Machineries, Auxiliary materials, Components, Emissions, Energy.
- *How:* Generic suggestion, Resources list, Example.

In [13, Fig. 2] the following sample of a guideline is given:

> During supply task (WHEN – Premanufacturing),
> reduce the mass (ACTION – Reduce mass)
> of the raw material (WHAT – Raw material)
> by recycling waste material in your facility to make it new raw material for the product (HOW – Generic Suggestion).
> See list of structural resources (HOW – Resources list)
> In order to reduce the mass of the casting metal, the casting channels can be re-used for successive melting (HOW – Example)

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